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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

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DESPOILING THE SPOILERS

Harvesting a Paying Crop from Mouldy Syrup

(*See page* 145)

Vol. XV *No. 413*

Television Broadcasters Licensed

Radiovision

Despite its recent hearing on television broadcasting, in which optimistic opinions were expressed as to the present possibilities of this form of radio, the Federal Radio Commission is not yet convinced that it can render real service comparable with sound broadcasting. In granting the licenses to eleven of some fifty applicants to take part in television broadcasting, the Commisston has taken steps to insure that such activity shall be purely experimental.

The licenses are only issued for a period of six months, at the end of which time they will be automatically revoked. The broadcasters will have to make monthly reports of their activity, what scientific work they have done to advance the art, the exact times that they were on the air and the power used. Failure to perform any significant experimental work will be considered as grounds for cancellation of the license, as the Commission wishes to prevent anyone broadcasting television primarily for the purpose of selling television receivers.

Four bands are allocated for radiovision, or "visual broadcasting", as the Commission calls it, including still pictures, radiomovies and scenes of living actors. These are from 2000 to 2100 and 2100 to 2200 kilocycles (approximately 136 meters to 150 meters), and 2750 to 2850 and 2850 to 2950 kilocycles (approximately 102 to 109 meters). No station may use a band wider than 100 kilocycles, which is ten times the width of the ordinary broadcast band and ample for satisfactory television reproduction according to engineers. A band of 2200 to 2300 kilocycles is also reserved for radiovision, and will be assigned in the future with the provision that no interference is caused thereby with Canadian stations, which use the same band for other purposes.

Among the licenses granted were three to the Radio Corporation of America, in New York and New Jersey; two to the Jenkins Laboratory in Washington; one to the associated Jenkins Television Corporation of Jersey City; four to the Westinghouse Electric and Manufacturing Company, for stations at East Pittsburgh and Springfield, Mass., and two to the General Electric Co., for stations at Schenectady, N. Y., and Oakland, California.

Fifteen applications are still pending, and hearings will be held to determine "whether or not public interest, convenience or necessity would be fulfilled by granting of their applications." Three applications, those of the Shepard-Norwell Co., Boston; Frank L. Carter, Long Island City, N. Y.; and Boyd Phelps, Jamaica, N. Y., have been denied.

No television broadcasting will be allowed on any frequency in the broadcast band, except between 1 and 6 A. M.

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Poisoning Investigated

Hygiene

The committee recently appointed by Surgeon General H. S. Cumming of the U. S. Public Health Service to study the problem of radium poisoning occurring in New Jersey factories has just met in Washington to consider plans for beginning the study. All details of method and procedure were discussed and decided upon. According to present plans the study will be finished about July 1.

Radium poisoning occurred among employees of luminous watch-dial factories in New Jersey, causing illness and death in some cases. While the poisoning cases occurred among the girls engaged in painting the dials, all employees were found to be exposed to radium in varying degree. The present study is to determine among other things just how much radium is absorbed by the bodies of the workers, how this will affect their health and what safeguards may be taken. About 200 persons are engaged in the industry. Detailed physical examinations of these individuals will be made. The committee consists of public health and other physicians, including members of medical school faculties.

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INTERPRETING week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable typography and the most convenient arrangement.

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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

Hoover to Attack Crime and Disease

With President Hoover's inaugural promise of "a national commission for a searching investigation of the whole structure of our Federal system of jurisprudence", those interested in the intricate problems of human behavior see the beginnings of another of those famous Hoover inquiries that have already revolutionized ideas and relations in the field of business and the application of science to industry.

Crime in all its aspects will necessarily be considered by the proposed commission, although its recommendations and primary inquiries will be concerned with Federal laws and courts, particularly the enforcement of the eighteenth amendment. Since criminals and personalities do not change with mere legal jurisdiction, the fundamental facts and theories developed will be of interest to state and local police departments and courts that have to cope with murder, robbery, speeding and other such crimes.

The first and most direct step in the remedy of "the failure of our system of criminal justice" will probably be a stock-taking of the national system of jurisprudence in order to make it more efficient and effective in administering and enforcing the laws that now exist. Essentially this will be a task comparable with the reorganization of the production methods of a great factory, using the same designs and policies that the old management had used.

But while the reorganization is in progress there will arise the need for new facts, improved design and the discovery of fundamental facts. The old legal ideals of the sanctity of precedent probably will be found to be inadequate for the conduct of the new business. So early in the Hoover investigation of crime there are foreseen inquiries into the causes, kinds and the personalities that fill our courts and jails. There may be expected questionings of the need for certain laws and the best penalties to achieve the ideal of public protection with the maximum of individual freedom. On such points, the psychiatrist, psychologist, physician, and sociologist studying the mental and physical attributes of man will need to give evidence along with the lawyer, judge and policeman.

Facts will be utilized by Hoover, the president, as effectively as by Hoover, the engineer or the administrator. Even the most elemental and fundamental statistical facts on crime are lacking for the guidance of the national jurisprudence investigation, if it considers the wide aspects of crime and judicial procedure. Personality diseases, known as crime, must be classified and reported as efficiently as health departments record epidemics of physical disease.

In President Hoover's pronouncement that "in public health the discoveries of science have opened a new era" there is (*Turn to next page*)

New Einstein Theory Questioned

Physics

Doubt as to whether the new Einstein theory, welding electromagnetism and gravitation into one law, should be substituted for existing theories attempting the same unification, is expressed by Prof. A. S. Eddington, the Cambridge astronomer-physicist, in a communication to the leading British scientific magazine, *Nature*.

Questioning of the "unified field theory" of Einstein by Prof. Eddington is particularly significant because the British astronomer introduced the Einstein general theory of relativity to the world when he reported the confirmation afforded Einstein's predictions by the two British solar eclipse expeditions in 1919.

The analysis of the new Einstein theory by Professor Eddington is one of the first critical considerations given the new paper which was published only a few weeks ago.

"For the present, at any rate, a non-mathematical explanation is out of the question," Professor Eddington writes in analysing the Einstein paper, "and in any case would miss the main purpose of the theory which is to weld a number of laws into a mathematical expression of formal simplicity. We are chiefly interested in how it compares, both as to methods and results, with the existing field-theories which have had some measure of success."

Professor Eddington notes that the equations expressing the Einstein field laws do not appear as identities and he questions whether they will give satisfaction. He remarks critically: "To introduce a field law limiting the geometrical possibilities is a confession that the initial geometry was too wide. The ideal should surely be either to start with a geometry which precisely fits the phenomena so that it needs no supplementary field laws, or to start with the most unrestricted geometry and treat every limitation as a field law."

The field theory preferred by Professor Eddington is that developed by Prof. Hermann Weyl of Zurich, now at Princeton University as an exchange professor. He declares that Weyl's theory and its generalizations afford considerable enlightenment.

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More than half the feature moving pictures produced in Japan in 1927 were based on classical Japanese dramas.

The climate of Chile is like that of southern California, and produces luxuriant semi-tropical flowers and trees.

Coal Powder For Ship

Engineering

That pulverized fuel can be employed successfully in marine boilers has been demonstrated by C. J. Jefferson, head of the Fuel Conservation Section, United States Shipping Board, Merchant Fleet Corporation, New York, and Commander J. J. Broshek, U. S. N., office-in-charge, Fuel Oil Testing Plant, United States Navy, Philadelphia, in experiments carried on for the past seven years.

At the end of the war the United States Shipping Board had left on its hands a large fleet of ships, most of which were driven by steam and many of them burning coal. The efficiency of the hand-fired coal-burning boiler is rarely over 65 per cent. and ordinarily much lower, and the cost of the conversion of the vessels to oil-burning boilers or to oil-using Diesel engines would be considerable, so it was determined to test the pulverized fuel scheme on them. The S. S. Mercer, a cargo vessel of 9,500 tons, was fitted out with pulverizers and burners and so steamed out to sea on the first off-shore voyage of a seagoing vessel using pulverized coal as fuel. On her initial trip her efficiency was 95 per cent. of that of her best voyage as an oil burner. Certain defects in the apparatus were disclosed, but the method was demonstrated as safe and reliable for sea service and is recommended for small power plants on land. *Science News-Letter, March 9, 1929*

For the Teaching of Chemistry

For the teaching of Chemistry, as well as for instruction in other sciences, it is generally admitted that there is no equipment that enjoys the prestige and reputation among educators to the extent of

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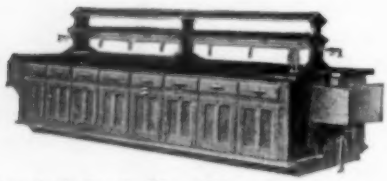

Chemical Desk No. 862

This desk, with exposed plumbing and trough, is a favorite and has been installed in many laboratories. The gas and water pipes, with convenient outlets, are placed under the lower shelf and directly over the trough. The trough is lead-lined and slopes from the middle toward the two end sinks. Accommodates sixteen students, working in sections of eight.

Every Science Teacher Knows

the importance of properly-designed, properly-built laboratory furniture, and how much influence it exerts upon the character of work of the students.

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Hoover to Use Scientific Methods—*Continued*

promise that this new scientific progress will be made available to thousands who otherwise would suffer. The man who saved the Belgian people during the World War, who then rescued the hordes of starving children that the war had left in Europe, believes that health is as much a concern of government as education. Vigorous warfare for better health is forecast in his statement that "many sections of our country and many groups of our citizens suffer from diseases the eradication of which are mere matters of administration and moderate expenditure."

What Is Time?

Astronomy—Philosophy

A. S. Eddington, in *The Nature of the Physical World* (Macmillan):

I have sometimes thought it would be very entertaining to hear a discussion between the Astronomer Royal and, let us say, Prof. Bergson on the nature of time. Professor Bergson's authority on the subject is well known; and I may remind you that the Astronomer Royal is entrusted with the duty of finding out time for our everyday use, so presumably he has some idea of what he has to find. I must date the discussion some twenty years back, before the spread of Einstein's ideas brought about a *rapprochement*. There would then probably have been a keen disagreement, and I rather think that the philosopher would have had the best of the verbal argument. After showing that the Astronomer Royal's idea of time was quite nonsensical, Prof. Bergson would probably end the discussion by looking at his watch and rushing off to catch a train which was starting by the Astronomer Royal's time.

Whatever may be time *de jure*, the Astronomer Royal's time is time *de facto*. His time permeates every corner of physics. It stands in no need of logical defence; it is in the much stronger position of a vested interest. It has been woven into the structure of the classical physical scheme. "Time" in physics means Astronomer Royal's time. You may be aware that it is revealed to us in Einstein's theory that time and space are mixed up in a rather strange way. This is a great stumbling-block to the beginner. He is inclined to say, "That is impossible. I feel it in my bones that time and space must be of entirely different nature. They cannot possibly be mixed up." The Astronomer Royal complacently retorts, "It is not impossible. *I* have mixed them up." Well, that settles it. If the Astronomer Royal has mixed them, then his mixture will be the groundwork of present-day physics.

We have to distinguish two questions which are not necessarily identical. First, what is the true nature of time? Second, what is the nature of that quantity which has under the name of time become a fundamental part of the structure of classical physics? By long history of experiment and theory the results of physical investigation have been woven into a scheme which has on the whole proved wonderfully successful. Time—the Astronomer Royal's time—has its importance from the fact that it is a constituent of that scheme, the binding material or mortar of it. That importance is not lessened if it should prove to be only imperfectly representative of the time familiar to our consciousness.

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A world wide shortage of soft woods is predicted by O. J. Sanger, of the British forestry commission.

Forty per cent. of the milk produced in the United States is made into butter.

The volcano Mount Etna is said to have decreased in height 112 feet between 1861 and 1900.

The brain of Anatole France, brilliant French author, weighed considerably less than the brain of an average day laborer.

A substitute for gum arabic and starch as a filler for fabrics is now being manufactured from sea-weed of the Pacific coast.

Government estimates show that there are about 30,000,000 students enrolled in educational institutions in the United States.

A steam engine designed by a Frenchman in 1769 was run on the streets of Paris at a speed of three miles an hour until it ended its career by turning over.

Making Money Out of Moulds

Botany

By Frank Thone

"Mould's doing very nicely this time, Dr. Herrick," says the serious, lean-faced young man. "Good thick growth; we'll get a very decent yield out of it."

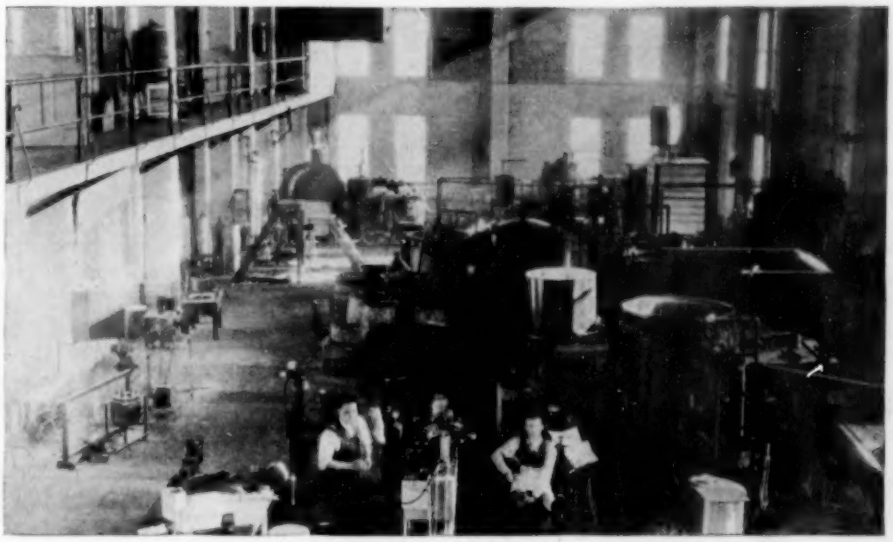
"Fine, Dr. May, fine!" smiles his chief, peeping over the rims of a rack of wide, flat trays. "Don't think you've ever had better mould than this."

This colloquy is not between a pair of lunatics taking a mischievous delight in setting things out to spoil. It might take place any day in the cluttered interior of a business-like, chemical-factory-looking sort of building on the U. S. Department of Agriculture experimental farm at Arlington, Va., just across the Potomac from Washington. The speakers are Dr. Orville E. May and Dr. Horace T. Herrick, chemists of the Color and Farm Waste Laboratory, who have found out a new way by which money can be made from moulds, and are passing their secrets along for the benefit of industrial chemists and the public generally.

Moulds have for ages been the sign of decay, of spoilage, of uselessness. When a piece of bread, a jar of preserves, an apple or orange, a neglected old shoe or glove has shown the telltale cottony white threads, variegated with patches of dusty black or blue-green, it has meant only that the mouldy object was ready for the garbage-can or trash-heap. Money in moulds? Only for the merchant who sells new things to replace the mouldy ones!

Yet here are a pair of serious, well-trained chemists getting their government pay-checks every month, who are day by day feeding good glucose by the hundredweight to one of these same pesky organisms, coddling and fostering its growth, giving it special apparatus for its accommodation, tenderly studying its wants as to temperature, water supply, mineral nutrients and so on—making a pet of a mould. And at the end milking that same pest turned into a pet for a valuable chemical. They feed their mould glucose that is worth, perhaps, five cents a pound wholesale. The chemical they get—gluconic acid—is worth 35 cents a pound, and before they started their work and showed how to get it out of mouldy glucose-water, it cost $100 a pound! That is what you can do if you treat moulds right.

But of course you must first have the right mould to treat right. That is the key to the whole business. It was not just a matter of going out and stopping the first mould they came to and asking it to make glucose acid out of five-cent glucose, and to do it at a reduction unheard of even at bargain-counter sales—$100 marked down to 35 cents. So far as now known, there are only two strains of moulds in the whole world that can do that. One is the mould our American chemists are using, the other is being experimented with in Germany.



THE INTERIOR of the Color and Farm Wastes Laboratory of the U. S. Department of Agriculture at Arlington, Va.

The history of the search for the mould that knows how to make glucose acid is condensed into its jaw-breaking botanical name—cryptically, but to the initiated no less intelligibly. The acid-maker is called *Penicilium luteum purpurogenum* var. rubri-*sclerotium* Thom, No. 2670. That means, first, that it belongs to the genus *Penicilium*. Now the Latin word *penicilium* is the same as the English word "pencil"; only it means a brush—artists and sign-painters call their smaller brushes pencils sometimes. The Romans, you see, used sharpened reeds or small brushes when they wrote on parchment or papyrus, just as the Chinaman does now when he writes a washee-checkee.

But even so, why should a mould be called a brush? The nearest it comes to looking like a brush is its occasional resemblance to a wad of cotton. But put under a microscope a tiny pinch of this *Penicilium* that has begun to look a bit greenish and take a look at it. You will see hundreds of little things that look like somewhat frayed-out brushes, with tiny glistening beads strung on the bristles in long chains. These are the spores, which serve these microscopic plants as seeds serve the larger plants of our more familiar world.

Luteum is quickly explained. The word means "yellow", and this particular mould frequently assumes a yellowish cast of color.

The *purpurogenum* part of the name means "purple-maker". You may have noticed, sometimes, that mouldy growths often have a little ooze of purple fluid around them, even though the material they are making mouldy is colorless itself. This particular one of the many species of *Penicilium* has the power to make a purple dye, and that is why it got that name. Dr. Herrick says that some day the Color Laboratory may look into the matter of that purple dye, after they have got the acid-making possibilities of the mould well in hand. So some day Dad's birthday necktie or Sister's Easter hat may be bright with a Tyrian tint made from what was once a mere fruit-spoiler.

The next piece of the name, "var. *rubrisclerotium* Thom", means that one particular variety of this yellowish purple-making mould sometimes forms hard little lumps that are colored red, and that the man who first noticed this was Dr. Charles Thom, of the U. S. Department of Agriculture. Finally, the number 2670 means that Dr. Herrick (*Turn to next page*)

Money from Moulds—*Continued*

and Dr. May chose for their acid-making experiment a sample out of culture-bottle number 2670 of Dr. Thom's stock of his pet particular variety of this species. All this history is boiled down into that one tongue-twisting name.

Having finally got the name and address of the one acid-making mould that would do the job they wanted done, the two Arlington chemists then solicitously inquired what working conditions would suit it best. First, what temperature did it want? They put flasks of glucose solution with mould growing on it into incubators at various temperatures from 68 to 95 degrees Fahrenheit. The mould grew fastest and produced most acid at about 75 degrees. At the lower temperatures it did not grow very well; at the highest is looked weak and anaemic, and at last sank in the solution of its own weight and so drowned.

Then they asked the mould how much glucose it wanted to work on. They put in various flasks solutions of from ten to forty per cent., going up by five per cent. jumps. Here again the fungus chose the middle ground, growing best and giving the highest acid yield on the 25 per cent. solution. Finally, they tested out the half-dozen mineral elements every living plant has to have, and found out what concentrations of these would make the moulds do the best work.

In these researches a double object had to be kept in mind. For first you have to get your mould, and then you have to put it to work. When a mould is "planted" in a solution of glucose, you don't see any difference at all at first. A bit of the mould threads, so tiny as to be simply lost on the surface of fluid, is all that it starts with. From this the growth is so rapid that in a few days the whole surface of the solution is covered with a continuous sheet of mould, and only after it has reached its most vigorous growth does the production of acid go on at highest speed. Since the mould has to use up some of the glucose in building its own body and therefore can not use it in making acid, Dr. May tried using well-grown growths of it several times, draining off the acid-charged solution and then flowing in fresh sterile glucose-water underneath the mould sheet. The fungus would float up again and immediately begin making acid as fast as ever. The same sheet of mould can be used over again several times in this way.

Having got the moulds to answer all these questions under laboratory conditions, with their cultures living cloistered lives in large, bacteriologically pure glass flasks, Dr. Herrick and Dr. May proceeded to get the process on a more practical basis. You would think the Color Laboratory is a small chemical factory, anyway, if you should stop at Arlington for a look at it; the place is full of vats and pressure kettles and iron machinery generally, instead of the small, shining glass tubes and bottles we usually imagine in a chemist's laboratory. The workers there are not content merely to find the theoretical answer to a chemical problem. They get that first, and then tackle the first steps of magnifying their test-tube results by ten thousand, and getting them on a factory scale. This always presents difficulties, as any chemist can tell you.

It would not, in the present instance, be commercially profitable to raise moulds for acid in glass flasks. Too much costly human labor would be involved in filling and emptying them. The logical thing to do is to pour your glucose solution into wide, shallow pans and let your moulds spread themselves on the surface. Build racks so that the pans can be set one above the other, and enclose the racks in sheet-metal boxes to keep out as much dirt and contamination as possible. Arrange pipes to drain off the acid solution, and other pipes to run in fresh glucose-water. In short, set up a small factory unit.

So it was done. And here the experimenters hit their problems. Wide metal trays are cheap and easy to get. But gluconic acid attacks and corrodes all common metals, ruining both the pans and itself. A manufacturer of enamel ware undertook to build an acid-proof pan, and succeeded. But it cost as much as a bathtub, so that would not do. Also, it was found that in order to prevent the solution from sloshing and slopping around in the wide pans they had to be criss-crossed with low partitions. So a built-up pan was necessary. Dr. May tried first to build one out of sheet bakelite. He made a good pan, but again it was too expensive and also too heavy. The problem was solved when it was found that one of the new brushing lacquers made of cellulose, similar to the stuff used on automobile bodies, was highly resistant to the action of the acid. So it was possible to use economically made metal trays painted with this acid-proof lacquer.

Other problems rose, and in their turn were faced and solved as the question of the trays had been. One of them was left largely to the mould itself. That was the matter of weeds. For there are weeds among moulds as there are among larger crops—useless fungi that make no acid, whose spores fall into the culture pans and grow like tares among the wheat. These weed-moulds eventually betray their presence by off-color patches—usually black—amid the cottony cream white of the useful fungus. Under normal conditions the acid-making mould grows so fast as to smother out most of this weed growth, as a healthy crop of wheat will keep down most of the wild vegetation that tries to invade it. But if the weed moulds get the better of the culture, then there is nothing to do but throw it out, clean and sterilize the pan, and start all over again. It is to this end that the rack of pans is kept enclosed, to keep out the drifting wild spores.

But having got their acid, the chemists were confronted with a further problem. Hitherto, gluconic acid has been offered at so high a price, when it has been on the market at all, that nobody has troubled to find any uses for it. So now that they have shown how it can be produced at a reasonable figure, they are turning to the question of finding uses for it. One dyestuff firm, Dr. Herrick says, states that they can use considerable quantities of it if a steady supply can be assured, but they make more or less of a trade secret of what this use is. The chemists at Arlington, however, have found another possible use which is not kept secret. Calcium, one of the two most important ingredients of our bones, naturally figures rather largely in medicine. Only, the compounds in which it is now on the market make it exceedingly nasty to take. Combined with gluconic acid, however, it can be put up as a pure white powder without any taste whatever. There is work in the drug business for a good many mould "farms", pending the discovery of other occupations for the fungus.

Gluconic acid manufacturing is the second modern business which moulds have invaded in this country. The first mould-acid venture is already a commercial success, at least one factory in New York being now on the tons-per-day basis with it. This factory makes citric acid, which is the acid of lemons and other citrus fruits, and competes with the original citric acid business of (*Turn to next page*)

Money from Moulds—*Continued*

California, which extracts the product from fruits rejected as unfit for packing in the orchard regions. Paradoxically enough, the mould that makes citric acid belongs to the same group as the "green mould" that spoils many lemons in shipment and storage. Citric acid is widely used in industry and medicine. It forms the basis of lemon extract used in flavoring. And no big-league baseball game can be successfully run without it, for citric acid is indispensable in the manufacture of pop.

But the manufacture of gluconic and citric acids with the aid of fungi is only a modern manifestation of a very ancient craft, which, like many another handiwork of men that dates back to times older than history, has been carried on in total unconsciousness of the scientific secret underlying the process. Man has been a fungus-user from time immemorial, in many of his most widely practiced arts, but especially in those that have to do with the preparation of food. For, oddly enough, though he usually refuses to eat anything that is visibly mouldy, he has a perverse preference for some things that are the results of mould action on raw materials that are really good food materials when they are fresh.

There is cheese, for instance. Cheese is nothing but milk curds that have been allowed to stand and get all mouldy. The older and mouldier the cheese the better it is. Watch a seasoned gourmet selecting some choice Parmesan some time. He picks the cheese with green whiskers every shot!

If, during the recent celebrations at the coronation of the Emperor of Japan, you had suggested to a loyal subject of that monarch that he was drinking health and long life to his sovereign in mouldy rice-water, you would probably have found yourself involved immediately in something resembling a war. But *sake*, that potent rice wine that is Japan's national drink, is produced from an infusion of rice by the action of a mould. Similarly, *sho-yu* sauce, which you find in hair-tonic bottles in the chop-suey restaurants, is prepared from soy beans by fermentation with moulds. The same sauce, plus a lot of pepper and some other cryptic ingredients, becomes Worcestershire sauce.

Not only moulds but their relatives, the bacteria and yeasts, are old-time though until recently unknown allies of man in his food-preparing. Mankind has been making the two big

RETOUCHING one of the wide metal culture trays with acid-proof lacquer

B's, Bread and Beer, a great deal longer than he has been making written history; both are yeast products. Noah's disastrous adventure with some wild yeasts is well known; and the elaborate "purging of the old leaven" practised by the Jews at Pesach is simply a precaution needed to keep the household culture of yeast pure and uncontaminated, backed by the force of religious authority.

Bacteria are not so closely related to the moulds as are the yeasts, but they are still regarded as members of the fungal cousinship. Bacteria have to act on cream before it can be made into butter, and bacteria-treated milk, under a variety of trade names, is now a widely used health food. Some cheeses are made by the action of bacteria on milk solids. Sauerkraut, another ancient food now coming to be regarded as "good for you", is simply shredded cabbage that has undergone bacterial fermentation.

The industries depending on moulds, yeasts, bacteria and other forms of minute plant and animal life are now just on the threshold of passing from the old rule-of-thumb, empirical methods of the ages to the new, exactly controlled, scientific methods of the future. Making citric and gluconic acids with the help of moulds, controlling the fungus flora of food factories and dairies, manipulating the growth of yeast in bakeries, are only pioneering steps. The time is coming when these microscopic fungi will be grown not for their by-product but for themselves, when yeast by the ton will be cattle food or perhaps even human food, and when the cellulosic bodies of now despised moulds will perhaps be moulded into "art ivory", or dissolved and spun into rayon, or made into glistening lacquers for motor cars. The possibilities of micro-agriculture are only beginning to be opened up.

Science News-Letter, March 9, 1929

In the 15 years between 1851 and 1866, the floods which altered the course of the Yellow River of China took the lives of more than 30,000,000 people through drowning or malnutrition.

New Ideas on Personality

Psychiatry

The keynote of the present tendency in psychiatry and psychology is the appearance of the idea that personality is not just the physical constitution and psychological and mental traits, but the integration of all of them, declared Dr. Karl A. Menninger, director of the Menninger Clinic of Topeka, Kans., at the opening session of the American Orthopsychiatric Association's sixth annual meeting in New York.

Psychiatrists must break out of the vicious circle, known to medical men, into which they are now falling, advised Dr. James S. Plant of the Essex County Juvenile Clinic of Newark, N. J. He said that psychiatrists and social workers, seeking a cause for the child's behavior problems, were going back in a procession to an earlier and earlier period in the child's life, to the prenatal period, to the parents and finally to the parents' childhood. Thre was no telling where this might lead to, he said. The surgeon, confronted by the vicious circle in medicine, does not seek the original cause but tries to cut out the immediate cause of trouble. Psychiatrists should try more to relieve actual conditions without looking too far for their ultimate cause, he advised.

Science News-Letter, March 9, 1929

California leads this country in power farming, Wisconsin running a close second.

Ideals in Food Advertising

Public Health

DR. E. V. MCCOLLUM, School of Hygiene and Public Health, Johns Hopkins University, before the American Public Health Association meeting:

Yet in the main advertising does not yet command sufficient confidence to be a very effective guide for buyers. Many advertisers still tell half-truths, and are decidedly partisan in a deliberate effort to sell the purchaser rather than to help him buy wisely. The mail-order houses have built up a confidence among their patrons by describing honestly the mediocre and superior articles. They try to point out that for certain purposes a low-grade article may be satisfactory. If on seeing the goods it is found to be not what was wanted the buyer is privileged to return it without loss.

Easy to Dress Up Half-Truths

Certain soap, tooth-paste, cereal, face creams and cigarette manufacturers afford examples of national advertising in which extravagant and dishonest claims are the rule. Many of these likewise build their advertising displays upon pseudo science. People have had explained to them in recent years so many things they do not understand, but nevertheless believe because of visual evidence of the marvels of modern science, that it is easy to dress half-truths in the most plausible language. But this is done to the disadvantage of honest advertising, and an enormous amount of waste results from the major half of the advertising world trying to instruct and build up confidence, while a minor half, playing upon credulity, tries to delude and profit by sharp practices which tend to destroy confidence.

The food industry, because of the spectacular advances of the last quarter of a century through scientific research, has been greatly tempted to engage in dishonest advertising. We know a great deal about quality in foods on the basis of the proportions of the indispensable nutrient principles which each contains. Much information has been gained about how far one food supplies in adequate amounts the nutrients which are not abundant in another. In short, we have much useful information about how foods should be selected, and in what combinations and proportions they should be eaten in order to provide all the essential nutrients, afford a proper physical character to facilitate digestion and promote intestinal hygiene, promote optimal development in the young, preserve their teeth from decay, and in the adult promote health and longevity. There is no significant difference in the views of perhaps twenty-five of the world's most experienced investigators in this field as to what should be said about the place in the diet of any of our more important foods, natural or manufactured, uncooked, cooked or canned.

The type of advertising which we must all deplore is that which invokes the aid of science in support of a product but in which the rules which govern research in science are violated. Half-truths or plausible theories which do not apply are presented, together with a picture which itself tells a story which is misleading.

No Sportsmanship

There is keen competition among food producers and food manufacturers of many kinds, and in many cases the competitors are striving to win without consideration for each other, restrained in their methods only by the necessity for maintaining the outward appearance of respectability. All well-informed people see daily in the magazines, newspapers and on billboards and labels statements which are the counterpart of the glossy duplicity of the confidence man. Not only is there no sportsmanship in much of our food advertising, but its untruths are so thinly disguised that public confidence is in great measure broken down, at least as respects the more intelligent readers of advertisements. The futility of such a course is apparent when one considers that there are thousands of women teaching home economics and domestic science who are sources of authentic information about foods, and about progress in nutrition studies. Dishonest advertising tends to create apprehension in the minds of conscientious mothers, and those who suffer from one or another condition in which some special nutritional regimen is necessary for their recovery or for the maintenance of health. The result is that many persons are confused, and are easily made victims of faddists and unscrupulous promoters.

Science News-Letter, March 9, 1929

Many of the little statues of children found in the ruins of ancient Babylonia and other eastern countries are believed to be votive offerings to a deity in thanksgiving for the birth of a child.

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Martyrs Get Pensions

Medicine

The House bill providing pensions of $125 per month for Army officers and enlisted men who took martyrs' parts in the yellow fever investigations carried on by army doctors in Cuba in 1900, or for their widows or heirs, has been passed by the Senate.

There are 14 of these men, twelve of whom were privates. A pension for Mrs. Walter Reed, wife of Major Reed, who was in charge of the yellow fever work in Cuba, was provided years ago, but recent efforts to increase this amount above its present amount of $150 per month failed in the House, the chairman of the Pensions Committee there maintaining that such pensions must be held down within "reasonable limits".

The bill as passed does more than make certain pensions of $125 per month for each of the men concerned.

It provides that the Secretary of War shall publish their names annually in the Army Register as a roll of honor, and that each of the men or their heirs shall be presented with a gold medal. The Secretary of the Treasury is to decide upon the design of these medals and $5000 is to be appropriated for making them.

The names to be carried on the roll of honor are: Walter Reed, James Carroll, Jesse W. Lazear, Aristides Agramonte, James A. Andrus, John R. Bullard, A. W. Covington, William H. Dean, Wallace W. Forbes, Levi E. Folk, Paul Hamann, James F. Hanberry, Warren G. Jernegan, John R. Kissinger, John J. Moran, William Olsen, Charles G. Sonntag, Clyde L. West, Dr. R. P. Cooke, Thomas M. England, James Hildebrand, and Edward Weatherwalks.

Senator David Reed, Republican, of Pennsylvania, chairman of the Senate Military Affairs Committee, in explaining the bill to the Senate, where it passed with no opposition, said:

"Back in October, 1900, Dr. Walter Reed took his yellow fever experiment crew to Cuba and did one of the greatest things that had ever been done up to the time in the history of preventive medicine. He found that all existing theories for the cause of yellow fever were wrong, and he proved that it was due to the bite of an infectious mosquito of a particular variety.

"He could not have proved that fact had it not been for the heroic assistance of about 25 men in his detachment who underwent the most terrible experiments in order to prove that yellow fever (*Turn to next page*)

Michelson Our Biggest Asset

Physics

Prof. Albert A. Michelson, eminent physicist of the University of Chicago, is a bigger world asset than any billion-dollar corporation in the United States or all of them put together, declared Dr. Robert A. Millikan of the California Institute of Technology, at the dinner of the Society of Arts and Sciences where both these eminent scientists were awarded the society's gold medals for 1929 for scientific achievement.

"I personally believe that the United States has not had in this generation a greater economic asset than Albert A. Michelson," said Dr. Millikan. He based his statements on the importance of Professor Michelson's super-refined experiments which in themselves and in the paths they have opened to other investigators have revolutionized many of our ideas.

"In the last analysis there is nothing that is practically important at all except our ideas, our group of concepts about the nature of the world and our place in it, for out of these spring all our conduct," Dr. Millikan said.

Specifically he referred to Professor Michelson's ether drift experiments, carried on for 40 years. This great work proved definitely that there is no speed of the earth with respect to ether. Einstein's startling theory of relativity grew chiefly out of Professor Michelson's experiment. "Historically it is hard to see how it could have been arrived at without both Michelson's own very exact measurements and others of the kind he led the way in showing how to make," Dr. Millikan explained.

His own work with cosmic rays is likewise based on the Michelson and Einstein results. Millikan and his co-worker, Dr. George H. Cameron, concluded as a result of their experiments that the evidence is very strong that the cosmic rays are the subatomic radio signals broadcasting the continuous creation of the abundant elements somewhere.

"In the future, as in the past," said Dr. Millikan, "man will depend entirely upon the sun for his supply of available energy." The process of building up atoms in space, of which cosmic rays are evidence, which would give a practically unlimited supply of energy, cannot take place on earth.

Earlier in the day Dr. Millikan reviewed the chief features of his work with cosmic rays, speaking before the joint meeting of the American Physical Society and the Optical Society of America. Dr. Millikan reiterated that neither the sun nor the stars had any effect on cosmic rays and showed the steps by which he arrived at his conclusion that those rays, together with two other generalizations, are direct evidence that the process of atom building is going on now.

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Bantams to Hunt Beetles

Entomology

A greenhouse owner near Philadelphia is hunting for a flock of bantam chickens which he proposes to turn loose among his plants, states Dr. W. A. McCubbin of the Crop Protection Institute. The idea is that they will devour the Japanese beetles as fast as these insects emerge from the soil. Although their numbers are too few to cause any considerable loss from adult feeding injury, the greenhouse man is sensitive about the matter; possibly in the present state of public sentiment he feels toward them as the housewife does toward bedbugs —it's not nice to have them around. Hence the bantams, which are known to have been used with good effect in greenhouses afflicted with the strawberry root worm.

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The volcano Etna covers an oval site 30 miles long and 23 miles wide.

Light Fan Guides Fliers

Aviation

Rotating fans of vari-colored light such as will guide future aviators to safe landings at night are now in operation at the Cleveland municipal airport.

The airport beacon by rotating reaches the pilot at any angle at which he may approach the field. Half of the beam is white and half red, producing alternate flashes to distinguish the beacon from the brilliant lighting of parks, railroad yards or streets. High candlepower is used in order that light may penetrate fog as effectively as possible. Color is produced by special cover glasses placed over the incandescent lamp projectors.

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The American negro is less susceptible than the white man to diseases which enter the body by way of the skin, a zoologist at the University of California declares.

Interesting Books of 1928

Your shelf of scientific books needs constant replenishment to keep it up to date. Science Service recommends every book on the list below—and every book listed was published during the past year. Select those of interest to you, and let us mail them to you!

☐ Bailey, L. H.—*The Garden Lover.* New York, 1928.. $1.50

☐ Beebe, William — *Beneath Tropic Seas.* New York, 1928. ..... 3.50

☐ Boas, Franz — *Anthropology and Modern Life.* New York, 1928..... 3.00

☐ Bower, F. O.—*The Ferns.* 3 volumes. Cambridge. Per volume. 10.00

☐ Byrd, Richard — *Skyward.* New York, 1928..... 3.50

☐ Cleland, Herdman F.—*Our Prehistoric Ancestors.* New York, 1928..... 5.00

☐ Clements, Frederic E. and Edith S.—*Flower Families and Ancestors.* New York, 1928. ..... 2.40

☐ Clute, Willard Nelson—*The Fern Allies of North America.* Joliet, Ill., 1928. ..... 4.00

☐ Coker, William Chambers and Couch, John Nathaniel. *The Gasteromycetes of the Eastern United States and Canada.* Chapel Hill, N. C... 12.00

☐ De Kruif, Paul — *Hunger Fighters.* New York, 1928. 3.00

☐ Humphreys, W. J.—*Physics of the Air.* New York..... 6.00

☐ Jordan, Edwin O. and Falk, I. S., ed. — *The Newer Knowledge of Bacteriology and Immunology.* Chicago, 1928..... 10.00

☐ McKay, R. C.—*Some Famous Sailing Ships and their Builder, Donald McKay.* New York, 1928.... $7.50

☐ Mottram, Vernon H.—*Physiology.* New York, 1928.. 3.00

☐ Ornstein, Martha—*Role of Scientific Societies in the 17th Century.* Chicago, 1928. ..... 3.00

☐ Oswald, John C.—*A History of Printing: its Development through 500 Years.* New York, 1928..... 7.50

☐ Shapley, Harlow and Howarth, Helen E.—*A Source Book in Astronomy.* New York, 1928..... 4.00

☐ Tilney, Frederick—*The Brain from Ape to Man.* 2 volumes. New York, 1928.. 25.00

☐ Thomas, William S.—*Field Book of Common Gilled Mushrooms.* New York, 1928. ..... 3.50

☐ Volz, Emil C.—*Home Flower-growing.* New York, 1928. ..... 3.50

☐ Wheeler, William M.—*The Social Insects: Their Origin and Evolution.* New York, 1928..... 7.00

☐ Willstatter and Stoll — *Investigations on Chlorophyll, Methods and Results.* Authorized English translation from the German. Lancaster, Pa., 1928 4.50

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Pensions—*Continued*

was not contagious but was contracted only in this one way.

"Some of these men put on the underclothing and night clothing of persons who had died of yellow fever, and for a month slept in the stained and almost indescribable bed clothing of patients who had died of yellow fever.

"Probably no finer heroism for the benefit of humanity had ever occurred in the history of the world. Others of these men, after the theory of mosquito inoculation had been proved to be probable, exposed themselves to the bite of infectious mosquitoes and when at first they did not fall ill of yellow fever they exposed themselves again and again until they did get it."

Mrs. Mary Goldberger, widow of Dr. Joseph Goldberger, late of the U. S. Public Health Service, is also now assured of a pension of $125 per month.

Science News-Letter, March 9, 1929

Backward Progress

Archaeology

W. J. PERRY in *The Children of the Sun* (Dutton), quoted in *The Scientific World View* (Macmillan):

Going backwards in time in America is like the ascent of a series of cultural steps, at the summit of which stands unchallenged the earliest of all, that of the Maya.

Science News-Letter, March 9, 1929

The Newer Photosynthesis

Plant Physiology

From a radio dispatch in a recent New York paper:

Some years ago Professor Willstaetter of Munich was able to analyze the breathing substance in plants called chlerephewllabi.

Science News-Letter, March 9, 1929

In ancient times honey was the chief sweetening for food and sweetmeats.

A public health report states that Malta fever in Iowa presents a health hazard comparable to that of typhoid.

Pima Indians who used irrigation 400 years ago are now to have a highly developed system of irrigation canals as the result of the Coolidge Dam project.

The Field Museum has received shoes once worn by an Australian medicine man, which were rounded at both ends so that the tracks would not indicate the direction in which the wearer was traveling.

CLASSICS OF SCIENCE: Linnæus' Classification

Botany

Compare this, the first comprehensive system of botanical classification, with modern schemes. Linnæus was the inventor of the double name for plants, giving genus and species.

PART ONE

A SYSTEM OF VEGETABLES, according to their Classes, Orders, Genera, Species, with their Characters and Differences. In two volumes. Translated from the Thirteenth Edition (as published by Dr. Murray) of the SYSTEMA VEGETABILIUM of the late Professor Linneus; and from the SUPPLEMENTUM PLANTARUM of the present Professor Linneus. By a Botanical Society at Lichfield, London, MDCCLXXXIII (1783).

Vegetable Kingdom

1. CREATED NATURE, by successive Seeds, with the assistance of the elements, modifies Earths into *Vegetables,* Vegetables into *Animals,* perhaps not contrarywise: she resolves each of them again into *Earths,* in a perennial increasing circle.
2. VEGETABLES have life, without voluntary motion.
3. They are commonly divided into three TRIBES.

   Those whose seeds have ONE COTYLEDON: Corn: 1, 2, 3.

   Those with Two COTYLEDONS: Plants: 4, 5.

   Those with No COTYLEDON: the class of Clandestine Marriage: 6, 7, 8, 9.
4. The NATIONS, which have supplied this conflux of inhabitants are principally
   1. PALMS. PRINCES, Vegetables of India, having a Spathe and a Spadix, eminent for their prodigious height, beautiful for their unvaried simple perennial stem, crowned with an evergreen tuft of leaves, and rich with the choicest treasures of fruit. *These are tributary to the Primates, or first order of animals; in particular to the Prince their cohabitant.*
   2. GRASSES. PLEBIANS. Plants of the field, producing Culms and Glumes, Rustics the most common, the most simple, and the most tenacious of life; constituting the multitude and strength of the vegetable kingdom; and which the more they are taxed and trod upon, the more they multiply. *These are Tributary from their vile hoards to almost all herbivorous animals, and by their Harvest in particular to the Prince their cohabitant.*

LINNÆUS
Ætatis 25
in his Lapland Dress
Car. Linnæus Eqr.

   3. LILIES. PATRICIANS, luxurious inhabitants of groves, Bulbous rooted Plants, displaying their shining festive garments. *They amuse the eye, and adorn the vegetable kingdon with the splendor of courts.*
   4. HERBS. NOBLES, Meadow Plants, Annual, of many Forms. *They enrich the kingdom of vegetation by their admirable Structure, variety of Tastes, their fragrant Ordors, and georgeous Colours.*
   5. TREES. HIGHNESSES, of the Order of Nobility, Inhabitants of the woods, perennial as to their stock, surrounded with *Servants* at their feet, and supporting destructive *Parasites. They erect their heads, resist the Winds, overshadow the stultry, moisten the dry with invisible showers, allure the Birds, and perfect their Fruit like so many Orchards of Nature.*

      SOLDIERS, Plants armed with Thorns or Prickles from both the last kinds. *They repel the attacks of the Mammalia or first class of animals.*
   6. FERNS. NEW-COLONISTS, Plants of obscurity, supported on Stipes, with Seeds on their backs, poor. *These prepare the Earth for their successors.*
   7. MOSSES. SERVANTS, Plants of the winter, Imbricated, Calyptred, Revivescent, hungry, occupying in immense numbers all the places relinquished by the former. *These protect the Roots of other plants; lest they should be injured by the Winter Frosts, by the Summer Heats, the Vicissitudes of Spring, or the Putridity of Autumn; and collect for the benefit of others, the daedal Soil.*
   8. FLAGS. (algae) SLAVES, Plants which love the water, Squalid, revivescent, abstemious, almost naked. *These begin the first Vegetation on uncultivated places.*
   9. FUNGUSSES. VAGABONDS, Plants of the Autumn, Barbarous, Naked, putrescent, rapacious, voracious. *These at the Fall of the leaf are supported by the recrements of other plants.*
5. TEXTURE of vegetables consists of *Fluid-bearing Vessels; Air Vessels, Secretory Reservoirs.*
6. SUBSTANCE of vegetables, which covers their *Pith,* consists of a *Cuticle* externally covering the *Bark;* which Bark deposits on its interior side the *Rind;* which is converted annually into rigid *Wood. Wood.*
7. The principal PARTS of vegetables are three:

   ROOT descending, absorbing moisture, *nourishing.*

   HERB ascending, breathing the air, *moving.*

   FRUCTIFICATION expanding, inhaling ether, *producing seeds.*
8. ROOT, inserted into the moist earth, puts forth capillary *Rootlets,* often joining above into a solid *Stock descending* beneath the earth, or even *ascending* above the earth.
9. HERB annual, committed to the air, consists of the *Hybernacle, Trunk, Leaf, Prop:*

   Hybernacle a compendium of the whole Plant, scaly.

   BULB from the bases of the past leaves.

   BUD from the rudiments of the future leaves.
10. TRUNK, elevating the Herb and the Fructification, (the BRANCHES are Parts of the Trunk) is either

    STEM *of the Herb,* leafy.

    CULM *of Grass:* often knotted with empty joints. (*Turn to next page*)

Linnæus' Classification—*Continued*

SCAPE *of the Root* leaflets, flower-bearing.
PEDUNCLE, a flower-bearing *Branch* of the stem.
PETIOLE, a leaf-bearing branch, proper to the leaf.
STIPE, not distinct from the Leaf: in *Palms and Ferns.*

11. LEAF expanding its surface to the air, waving, often on a petiole.
LEAFLET, a part of a *compound* Leaf.
FROND, a Leaf made from a stipe: in *Palms and Ferns.*

12. PROP administering to the necessities of Life:
STIPULE of the Leaves, at their base, leafy.
BRACTE of the Flowers, at the base of the flowers or peduncles, leafy.
PUBESCENCE coathing with down.
GLAND separating a liquor.
THORN terminating with a wooden *horn.*
PRICKLE stretched out like a *claw* inserted only into the bark.
TENDRILL climbing by a *thread.*

13. FRUCTIFICATION temporary, at the extremity, expanding naturally by a spontaneous metamorphosis, so that the *Internal* substance appears in the Flower and in the Fruit.
FLOWER consists of the *Calyx, Corol, Stamens, Pistils.*
FRUIT consists of the *Pericarp* pregnant with *Seeds,* which are affixed to the *Receptacle.*

14. CALYX the exterior Covering of the Flower derived from the *Bark,* of which are seven kinds:
VOLVE of a *Fungus,* torn.
CALYPTRE of *Moss,* cowl'd.
SPATHE of a *Palm,* sheathed.
GLUME of *Grass,* generally two-valved.
PERIANTH of a *Plant,* near the corol.
INVOLUCRE of a *Plant,* remote from the flower, often of an umbel.
INVOLUCEL or partial Involcre.
AMENT BUDDY imbricated, common.

15. COROL the interior Covering of the Flower derived from the *Rind.*
PETAL membranous: with a *Border* or *Folds.*
PETAL membranous: with a *Tube* or *Claws.*
NECTARY nectar-bearing proper, producing hhoney.

16. STAMEN an external Organ, derived from the *Wood;* constitutes the *Male.*
FILAMENT sustaining the *Anther.*
ANTHER big with a granulated *Dust;* and this with the *Fovilla.*

17. PISTIL an interior Organ derived from the *Pith;* constitutes the *Female.*
GERM, a rudiment of the Fruit, beneath.
STYLE, elevating the Stigma from the germ, intermediate.
STIGMA, dewy, pubescent, above.

18. PERICARP, the *Germ* after the fall of the flower seed-bearing:
CAPSULE, membranous, gaping with *valves* variously in various plants.
SILIQUE, membranous, *two-valvea,* each suture bearing seeds.
LEGUME, membranous, *two-valved,* one suture bearing seeds.
FOLLICLE, membranous, *one-valved,* gaping on the side, not attached to the seeds.
BERRY, pulpy. with separate *Seeds.*
DRUPE, pulpy, with a bony *Nucleus.*
POME, pulpy, a *Capsule* including the seeds.
STROBILE, imbricated, the pericarp of a contracted *Ament.*

19. SEED, an *Egg,* pregnant with the new plant, deciduous, coated.
HILE, the navel-scar.
COTYLEDONS, absorbent, constituting the uterine placenta.
HEART, a compendium of the new plant, connecting the cotyledons:
with a pointed *Beak* germinating downwards.
with an imbricated *Plume* growing upwards.
PAPPUS sometimes crowns the seed.
ARIL sometimes includes the seed partially.

20. RECEPTACLE: the *base* connecting all parts of fructification.
PROPER of one flower.
COMMON *to many* sessile *florets.*
UMBEL, between the calyx and the flower, elongated into equal peduncles.
UMBELLET, a partial umbel.
CYME, a compound umbel with alternate branchlets.
SPADIX, within a Spathe, particularly of the Palm.
RACHIS, the receptacle of the Spike of Grass, on which the flowers are ingraved.

21. Vegetable MECHANISM consists of two contrary substances:
The CORPOREAL, external one, including nourishing, descending, adhering to the earth, carefully surrounding the pith, hardish, growing with a very tender point.
The internal PITH, or MEDULLA, included, vivifying deliquiscent at the base, ascending at the point, infinite in multiplication in divisibility and in termination, enlivened at its creation, secretly and gradually at its beginning extends itself where there is least resistance, to its final exit; where, the more feebly it is confined by the corporeal part, the sooner it breaks its prison, about to undergo its metamorphosis; and escaping joins itself with the corporeal part, that dispersing itself into new lives the circle of vegetation may be perennial.

22. GERMINATION is produced from the *Seeds* being dispersed and absorbing water by the *Hile;* whence the membranes are burst by the bibulous swelling *Cotyledons;* which give nourishment to the *Heart;* till the *Beak* of the foetus puts out Rootlets; by which the *Plume* is elevated, growing into an annual *Herb,* terminating in a super-decompounded *Bud.*

The System of Vegetables will be completed next week with Linneus' explanation of the development and function of each part of the plant, and his characteristic and amusing criteria for distinguishing TRUE BOTANISTS from FALSE BOTANISTS.

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The Uses of Botany

Botany

BERTON BRALEY, in *Sunshine Magazine*:

There should be no monotony
In studying your botany;
It helps to train and spur the brain—
Unless you haven't gotany.

It teaches you—does botany—
To know the plants and spotany,
And learn just why they live and die,
In case you plant, or potany.

You learn from reading botany
Of woolly plants and cottony
That grow on earth, and what they're worth,
And why some spots have notany.

You sketch the plants, in botany,
You learn to chart and plotany,
Like corn, or oats. You jot down notes,
If you know how to jotany.

Your time, if you'll allotany,
Will teach you how and whatany
Old plant or tree can do or be,
And that's the use of botany!

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Tularemia In Siberia

Pathology

Tularemia, one of the new diseases which until now has been apparently limited to this country, has just appeared in Siberia. A short time ago it was recognized for the first time in Japan. Now a specimen of blood serum from a guinea pig was recently received by the Hygienic Laboratory here with a request to examine it for tularemia. The examination was made and showed that the blood came from an animal infected with the disease.

The specimen had been sent from the Sanitary and Bacteriological Institute of Sderdlovsk (Ekaterinburg) in the Ural region of Asiatic Russia.

Tularemia was recognized in this country only during recent years. It made its appearance first in the West. Hunters and others who handled rabbits were suffering from a strange new illness. Dr. Alec Francis of the U. S. Public Health Service discovered that the disease was caused by an organism found in rabbits or other rodents which transferred it to men by their bites. Also, merely handling the infected animal, as in the case of butchers dressing rabbits, was a source of infection.

Until the report of a case in Japan a few months ago the disease had not occurred, or at least had not been recognized, outside of the United States. Dr. Francis, who has done all the pioneer work on tularemia and is an authority on the subject, thought the disease was traveling from west to east. The New England States have not had any cases so far, and it has only very recently appeared in New York State. Whether it has jumped clear over to Siberia in its eastward course or whether it has always been there, though unrecognized, is a question.

Science News-Letter, March 9, 1929

Two Laboratories?

Engineering

Two hydraulic laboratories instead of one will probably solve the problem now before the House Rivers and Harbors Committee as to whether the Bureau of Standards or the Board of Army Engineers should have jurisdiction over the hydraulic laboratory provided by a bill which has already passed the Senate.

Representative S. Wallace Dempsey, Republican, of New York, chairman of the House Rivers and Harbors Committee, has informed Dr. G. K. Burgess, director of the Bureau of Standards, that he is in favor of an hydraulic laboratory to be administered by the Bureau, but that inasmuch as the Board of Army Engineers objects to having research work concerning their activities on the rivers and harbors of this country carried on in another department of the government, he believes that it will be wise to provide for two such laboratories. The one for the Army Engineers, it is believed, will be located near Fort Humphries, and conducted in connection with the Army Engineering School.

Chairman Dempsey plans to add these hydraulic laboratory bills to the omnibus rivers and harbors bill which will be introduced, referred to the Rivers and Harbors Committee, and thereafter soon reported out, as soon as possible after the Seventy-first Congress convenes.

Some provision will be made in the language referring to the work of the Bureau of Standards laboratory, it is believed, whereby laboratory work relating to the behavior and control of river and harbor waters will be undertaken only at the request of the chief of Army engineers.

Science News-Letter, March 9, 1929

College Men Are Rangers

Forestry

Pioneer rangers, who knew their West but didn't know much about trees; present-day rangers who come out knowing their trees but who have to learn their West, furnished dramatic and diverting material for Will C. Barnes, veteran U. S. Forest Service man, who talked before the joint meeting of the National Forestry Association and the Florida Forestry Association.

The first rangers, Mr. Barnes said, were for the most part ex-cowboys. They wore the shaggy chaps and the five-quart hats proper to that ancient and honorable calling, and trees to them had always been taken for granted as mere incidents of ranch life. But they knew horses and cattle and sheep, and proved admirable in handling the knotty problems of grazing in the national forests.

Then the new generation of school-trained men began to filter in. The old-timers took them in hand. Naturally they "gave them a ride", but the youngsters were game, stood the gaff, and learned their business. Sometimes they showed the former cattle gentlemen a trick or two of their own. And from such a mingling of old elements and new the Forest Service has grown up.

Science News-Letter, March 9, 1929

Nature Ramblings

By Frank Thone

Natural History

Wild Geese

Thawed snows, a bright day following a long rain, lakes and ponds high with melted ice—and a wedge of wild geese sails above the sunset, heading north. Spring is surely coming.

Geese have always been associated with human beings. They were probably among the first domesticated fowl, and have borne strangely contradictory reputations for both sagacity and silliness. As a matter of sober fact, they are probably less silly and more sagacious than almost any of the larger birds, and the courage and family devotion of an old gander should be a real edification among the looser morals and easier ties of the barnyard.

Like many familiar birds, the goose has given rise to many unfamiliar tales, none the less interesting merely because they are not true. The slight resemblance in appearance between geese and the stalked barnacles called "goose barnacles" early set in circulation the idea that they were related. In its most fantastic form, the legend told of trees whose leaves or fruits fell into the water and became "birds called barnacles". This happened, most conveniently for the tellers of such tales, in the far North:

"So, slow Bootes underneath him sees
In th' ycie iles, those goslings hatcht of trees;
Whose fruitful leaves, falling into the water
Are turned (they say) to living fowls soon after."

It was, perhaps, easier to believe these tales of the origin of wild geese, since the breeding grounds of these birds were so far north that the inhabitants of Britain and Central and Southern Europe knew very little of them except by hearsay.

Science News-Letter, March 9, 1929

Interview with a Fool Hen

Natural History

W. T. HORNADAY, in *Wild Animal Interviews* (Scribner's):

I never before had met those birds, and I knew that they didn't know me, but they were absolutely unsuspicious and unafraid. They were fool-hens. The men of the Rocky Mountains call them that because those birds do not know how merciless and deadly men are, and therefore do not at once fly from man's baneful presence. If you pretend that you are harmless and friendly, sometimes you can slowly walk up to a fool-hen, near enough to kill it with a stick.

Without any stick or other evil-mindedness I slowly walked toward the nearest Franklin grouse—a handsome male bird in his fine, new, fall plumage. Without a flutter of wings he sat there and actually permitted me to come within seven feet of him. And he sat on a limb not an inch more than six feet from the needle-covered, sweet-smelling forest floor.

"Well, simp," said I affably, "what in the world are you thinking of that you don't make a good get-away?"

"Why should I? I don't fly half a mile from every bear and skunk that comes near me, so why should I fly clear away from my feeding grounds just for you? You have no big teeth nor long claws."

"But has no one ever told you that two-legged man is the deadliest animal there is toward all birds that permit him to come close to them?"

"No," said he calmly. "No one ever mentioned it to me. What does man do to birds like me? I'm not a wild animal with horns, or a furry hide."

"Well," I said, "he kills you with shot-guns, rifles and revolvers; and many a foolish grouse is knocked to death by a stone or a stick."

"I want to know!" exclaimed Simp slowly.

"You fool-hens," I continued, "are victims of misplaced confidence. All of your mountain relations are so dull and stupid about man that they actually seem demented. Even after a man begins to shoot or to throw stones at one of you, you'll just sit there as if glued to the branch until at last a bullet or a stone gets you. You fellows don't know enough to grasp a new idea until you are in the frying pan."

"I guess it's because we don't understand why we ought to feel scared, and why we should fly away. But honestly, sir, I never dreamed that you could be more deadly than a skunk or grizzly bear, or that you could be mean enough to keep on attacking a poor foolish bird after it had shown its confidence in your sense of right and wrong, and your goodness of heart."

"Goodness of fiddlesticks!" I exclaimed, peevishly. "Out in the wilds there ain't no goodness of heart in men toward the wild birds and beasts and fishes." (That was a little too strong, but I was some wrought up.)

"That may be true of you men," said the grouse, "but not of the wild creatures. We give one another a square deal. It's our rule to live and let live. But apparently we do need to turn over a new leaf about men. Now, what would you, as a friend of the fool-hens, advise us to do?"

"Well," said I, "first off, quickly pass the word around that man is the most dangerous animal that roams the earth; that every man, boy and baby-in-arms must be ticketed 'dangerous,' and that every grouse, big and little, must fly whenever he appears. And you must be quick about it, too. Learn from the ruffed grouse of the East. He knows men. When he suddenly meets a loaded man on a trail he don't hop up to a lower limb, in plain sight, and sit there as an easy mark to be murdered in cold blood. No, sir!"

"What does he do?" queried the fool-hen, with interest.

"He leaps high up, explodes in the air like a bomb, scares the man out of his wits, and with a roaring burr and whirr he goes rocketing off through the timber at sixty miles an hour. Just why he doesn't knock his brains out against half a dozen trees at once I never could make out. And nine times out of ten he saves his bacon."

"There's risk in that plan," said Simp, "but it's better to take it than to leave it and be killed. Really, I must at once get busy and tell all my people what you say, and start a reform. Our grouse mothers must teach the wisdom of the ruffed grouse to all their children, and bring them up right."

"Now you are on the right track!" I said. "This 'fool-hen' business has gone far enough."

Science News-Letter, March 9, 1929

The Buffalo Passes

Mammalogy

E. DOUGLAS BRANCH, in *The Hunting of the Buffalo* (Appleton):

There must once have been thirty million buffaloes roaming a vast range of American prairies and forests; when Grover Cleveland was moving into the White House a second time, there were about a thousand and ninety, and nearly all of these were in far northern fastnesses or in captivity. The thirty million had been hunted down—hunted, shot, pierced, impounded, tricked, for the fun of it, for the money in it, for the necessity of it. It was an awful, epic hunt—story that demands to be told honestly and dispassionately, or not at all.

The range of the buffalo included the Mississippi delta, the Pennsylvania mountains, Northern Mexico, the upper shores of Great Slave Lake; it enveloped nearly two-fifths of the entire area of North America. The restriction of this range, gradual, then suddenly ruthless; the coming of new peoples who hunted; the ways, the tools, the laws of the hunt: that is the meat of this narrative. Naturally, emphasis is given that loud, lusty frontier of the eighteen-seventies and eighteen-eighties, when the western herd of over seven million buffaloes was shattered and annihilated, and barely eighty scarred fugitives were left. This buffalo hunters' frontier sprang up with so little warning, and collapsed with such inglorious speed, that it has missed its share of attention; the history of the buffalo hunt is almost as scattered as the buffalo bones left to moulder on the prairies.

Science News-Letter, March 9, 1929

A porcupine quill is fitted with almost 1,000 tiny barbs that make it a most unpleasant weapon.

Seeds sown by women grow better than seeds sown by men, according to an old Indian belief.

Monuments and remains of ancient civilization in Egypt probably exceed in bulk all those of the rest of the ancient eastern world, according to Dr. James H. Breasted, of the Oriental Institute.

There are not more than 500,000 foreigners living in China, exclusive of Mongols and Korean settlers, whereas there are more than 10,000,000 Chinese living abroad, according to consular estimate.

FIRST GLANCES AT NEW BOOKS

LABORATORY ASTRONOMY — Harlan True Stetson—*Eastern Science Supply Co.* ($1.75). Once a purely descriptive subject, college astronomy has now developed into a laboratory course, largely due to the labors of Dr. Stetson and Dr. Duncan, of Wellesley, who collaborated with him in the preparation of this book. It is a laboratory manual, taking up such topics as construction of star charts, determination of the height of the earth's atmosphere from meteor trails, calculation of a lunar eclipse, and the use of equatorial telescope, sextant, and other astronomical instruments.

Astronomy
Science News-Letter, March 9, 1929

THE WORKS OF GEBER — Richard Russell—*Dent* ($2). Abu Musa Jabir ibn Hayyan, generally known as Jabir, or, in the Occidental form of Geber, was an Arabian chemist of the eighth century A. D., and his works are the most important of medieval chemical treatises. Translations of the Latin editions were made into French, English and German in the sixteenth, seventeenth and eighteenth centuries. Richard Russell's translation appeared in 1678, and is now rare, so the publishers are to be congratulated for issuing a new edition and thus making it readily available to modern readers. Figures from the 1545 Latin edition at Berne are added.

History of Science
Science News-Letter, March 9, 1929

INTERNATIONAL CRITICAL TABLES—Edward W. Washburn, Editor-in-chief—*McGraw-Hill* ($12). The fifth volume of this monumental work of the National Research Council, made possible by the cooperation of various industries and other nations. Tables relating to viscosity and fluidity, heat, light and soaps and aqueous solutions are included. Though it was originally intended that the work would be complete in five volumes, more have proven necessary, which will appear when completed.

General Science
Science News-Letter, March 9, 1929

INDUSTRIAL CARBON—C. L. Mantell—*Van Nostrand* — ($4.50). The second volume in the publisher's series of Industrial Chemical Monographs, in which the many industrial applications of carbon, as lampblack, charcoal, carbon electrodes, brushes, etc., are discussed.

Industrial Chemistry
Science News-Letter, March 9, 1929

TREES IN KANSAS—Albert Dickens, Margaret E. Whittemore, and Frank C. Gates—*Kansas State Board of Agriculture.* Since the coming of the white man the prairies and plains of the West, once thought of as "treeless," are assuming constantly increasing importance as partially timbered areas. This compact handbook of dendrology and systematics of Kansas trees will be useful outside the borders of the state for which it was published.

Botany
Science News-Letter, March 9, 1929

DAHLIAS—F. F. Rockwell—*Macmillan* ($1). This is a most worthy addition to the Home Garden Handbooks series, telling what dahlias to select and how to care for them. To lovers of this old and increasingly popular favorite, this little book will be highly welcome.

Horticulture
Science News-Letter, March 9, 1929

PLANTS OF CENTRAL IOWA—H. S. Conard—*Published by the author.* Beginning as a mimeographed local key for the use of botany students at Grinnell College, this has been expanded by Professor Conard until it is good for the entire central Iowa region. It is to be hoped that eventually it will grow into a member of the growing family of state floras.

Botany
Science News-Letter, March 9, 1929

FIELD MANUAL OF THE FLORA OF OHIO AND ADJACENT TERRITORY—J. H. Schaffner—*R. G. Adams* ($3). An analytical key, with brief synopses of genera. This is a very worthy addition to the literature of state and regional botany.

Botany
Science News-Letter, March 9, 1929

TREE CROPS: A PERMANENT AGRICULTURE—J. Russell Smith — *Harcourt Brace* ($4). Prof. Smith has long been one of those who view with just alarm the progress of soil denudation on American hillsides from which the mantle of protecting forest was stripped by a pioneer generation whose zeal was not equaled by its knowledge of agronomy. Here he proposes his remedy; not merely the planting of forests for wood, but their planting for food. Such little-thought-of things as acorns, carob pods and persimmons figure in his scheme for making the trees pay their own way while with their roots they hold our slipping soil.

Agronomy
Science News-Letter, March 9, 1929

HUMAN BIOLOGY—Edited by Raymond Pearl — *Warwick and York* (quarterly: $5 a year). This new magazine, just launched by Prof. Raymond Pearl and a brilliant board of collaborators, meets a most obvious want, for a journal wherein may be brought together studies in anthropology, anthropometry, psychology, physiology, genetics, statistics and a whole range of sciences in so far as they bear upon human life. The opening number brings a most promising list of contributors: Henry Fairfield Osborn, T. Wingate Todd, C. B. Davenport, Harry Bakwin, George Draper, and a symposium, Studies on Constitution, led by Prof. Pearl. With succeeding numbers keeping up to this level, *Human Biology* obviously becomes another one of those magazines a properly supplied scientific laboratory can not get along without.

Human Biology
Science News-Letter, March 9, 1929

THE COLLOID CHEMISTRY OF PROTOPLASM—L. V. Heilbrunn — *Borntraeger* ($5). Prof. Heilbrunn has done biologists in general, and biochemists and biophysicists in especial, a great service in getting into this single compact volume a concise and up-to-date account of what is perhaps the most difficult of all the branches of colloid chemistry. Not the least valuable feature of the book is its 43-page bibliography of the principal literature. The German publishers have done an excellent job of English printing.

Biochemistry
Science News-Letter, March 9, 1929

THE DEVELOPMENT OF GOVERNMENTAL FOREST CONTROL IN THE UNITED STATES — Jenks Cameron—*Johns Hopkins Pr.* ($3). This is a Brookings Institute study of the administrative history of forestry in this country, and to those who know what a kaleidoscopic and often hotly controversial affair that has been such a history will be most welcome. It need not be thought, either, that because it emanates from an institution devoted to research in economics that it is a chapter in a "dismal science"; on the contrary, the style of the narrative corresponds sympathetically with the vigor and liveliness of the topic.

History of Science
Science News-Letter, March 9, 1929

MODERN PHYSICS—Charles E. Dull —*Holt* ($1.80). A new and excellent high school physics text.

Physics
Science News-Letter, March 9, 1929

Book Reviews—*Continued*

WHAT IS WRONG WITH MARRIAGE?—G. V. Hamilton and Kenneth Macgowan—*Boni* ($3). A psychiatrist and a playwright collaborated on this study of a popular modern problem. The information was gathered by questioning 200 men and women. The authors regret that this number was not larger so as to be of more scientific value. Their conclusions will be read with interest by great numbers who are dissastified with the present status of marriage. Responsibility for the easy, pleasant style rests with Mr. Macgowan, who did the writing.

Sociology
Science News-Letter, March 9, 1929

THE FOOD OF JAPAN—Egerton Charles Grey—*Health Organization of the League of Nations* ($1.25). This publication gives the result of a detailed study of the quantity, quality, distribution and composition of food in Japan. It is confined to a statement of facts and avoids any expression of opinion. The object of the work is to supply information as accurate as possible on the subject as a basis for the study of the relation of food to the health of the people. The report will be extremely interesting to nutritionists and economists.

Nutrition
Science News-Letter, March 9, 1929

THE LIFE OF THOMAS A. EDISON IN WORD AND PICTURE—*Thomas A. Edison, Inc.* (Orange, N.J.) (Gratis). A brochure containing a complete pictorial history of this greatest of American inventors, ending with the award of the Congressional Medal last October.

Biography
Science News-Letter, March 9, 1929

THE RADIO INDUSTRY—A symposium—*Shaw* ($5). A complete account of the development of radio as an industry, particularly as embodied in the Radio Corporation of America, told by such leaders as General Harbord, David Sarnoff, Dr. F. B. Jewett, Judge Stephen Davis, Merlin H. Aylesworth and others.

Radio
Science News-Letter, March 9, 1929

THYROXINE—Edward C. Kendall—*Chemical Catalog* ($5.50). A complete treatise on the chemistry and pharmacology of this therapeutically important extract of the thyroid gland. It is a volume in the American Chemical Society's Monograph Series.

Chemistry
Science News-Letter, March 9, 1929

INTERNATIONAL HEALTH YEAR-BOOK—*Health Organization of League of Nations* ($4, paper; $5, cloth). This is the year-book for 1927, the third year of the work. It covers public health progress of twenty-seven countries during 1926. Reports from several countries are included in this volume for the first time. An effort has been made also to make the demographic part of the reports more uniform. This large volume will be of great interest and value to public health workers, historians and statisticians all over the world.

Public Health
Science News-Letter, March 9, 1929

COMMUNICABLE DISEASES FOR NURSES—A. G. Bower and E. B. Pilant—*Saunders* ($3). Elizabeth F. Miller, nursing consultant of the Pennsylvania Department of Public Welfare furnished a foreword to this textbook for nurses. The volume fills an important need in the training of nurses. It gives details of general medical aseptic technic, on which is based all communicable disease nursing and isolation. The actual nursing treatment of each disease, in hospital or home, is given, with a brief description of the nature and cause of the disease. All terms are defined in a glossary, and there are many illustrations. The book should be useful for mothers as well as nurses.

Medicine—Nursing
Science News-Letter, March 9, 1929

ROENTGENOLOGY—G. W. C. Kaye—*Hoeber* ($2). A little book by a leading authority that gives clearly and concisely the history of X-rays, the basic physical principles, some of the modern applications, such as crystal analysis and protective measures for the operator.

Physics
Science News-Letter, March 9, 1929

FROM CRYSTAL TO TELEVISION—Vyvian Richards—*A. & C. Black*—($2). A British book on radio that introduces some novelties in the explanations. The chapter on television describes only British methods, particularly those of J. L. Baird.

Radio
Science News-Letter, March 9, 1929

PRACTICAL RADIO—James A. Moyer and John F. Wostrel—*McGraw-Hill* ($2.50). The third edition of this deservedly popular text on radio.

Radio
Science News-Letter, March 9, 1929

THE BUREAU OF CHEMISTRY AND SOILS: ITS HISTORY, ACTIVITIES AND ORGANIZATION—G. A. Weber—*Johns Hopkins Pr.* ($1.50). This volume constitutes number 52 of the Service Monographs of the United States Government, issued by the Institute for Government Research of the Brookings Institution. As the title implies, it gives a concise statement of the work of one of the most important of the bureaus of the U. S. Department of Agriculture, recently created by the fusion of the previously separate Bureau of Soils, Bureau of Chemistry and Fixed Nitrogen Laboratory, taking in also some of the soil and fertilizer work previously carried on by the Bureau of Plant Industry.

History of Science
Science News-Letter, March 9, 1929

THE COMPOSITION OF WATER—J. R. Partington—*G. Bell & Sons* (*London*) (1s 6d). A volume in the series of "Classics of Scientific Method", a little book that tells of the historic work of Cavendish and others in determining what water was made of.

Chemistry
Science News-Letter, March 9, 1929

DYNAMICAL SYSTEMS—George D. Birkhoff—*American Mathematical Society* ($3). This is volume IX in the series of the American Mathematical Society's Colloquium Publications. Naturally, it is highly mathematical.

Mathematics
Science News-Letter, March 9, 1929

EXPERIMENTAL PHYSICS—Albert Edward Caswell—*Macmillan* ($1.40). A well-prepared college laboratory manual.

Physics
Science News-Letter, March 9, 1929

PATENTS THROUGHOUT THE WORLD—Wm. Wallace White and Wallace White; second edition by Byfleet G. Ravenscroft—*Trade Activities, Inc.* ($10). A complete summary of patent law in all countries. As the book is looseleaf. additions can be made to it from time to time to take care of changes. Anyone concerned with inventions or patents will find this work invaluable.

Invention
Science News-Letter, March 9, 1929

THE VEGETATION OF THE ALLEGANY STATE PARK—Norman Taylor—*N. Y. State Mus. Handbook* 5 (50c.). A popular discussion of the ecology of one of the most interesting of American state parks.

Botany
Science News-Letter, March 9, 1929